U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE
SUBCOMMITTEE ON ENERGY

HEARING CHARTER

Thursday, June 24, 2004
10:00 a.m.-12:00 noon
2318 Rayburn House Office Building

1. Purpose

On Thursday, June 24, 2004, the Energy Subcommittee of the U.S. House of Representatives Committee on Science will hold a hearing to examine the Department of Energy's (DOE) plans to establish the Idaho National Laboratory (INL) in 2005 as the lead Federal laboratory for nuclear energy research and development (R&D).

2. Witnesses

Mr. William D. Magwood, IV is the Director of the Office of Nuclear Energy, Science and Technology (NE) at DOE.

Dr. Alan Waltar is the Director of Nuclear Energy at the Pacific Northwest National Laboratory (PNNL) and is a past President and Fellow of the American Nuclear Society. He participated in the development of the report *Nuclear Energy: Power for the 21st Century*, which was put together by seven national laboratories.

Dr. Robert Long is the President of Nuclear Stewardship LLC, a private consulting firm. Dr. Long chaired the Infrastructure Task Force of the DOE Nuclear Energy Research Advisory Committee (NERAC), which evaluated the status of the Idaho laboratory complex and recommended improvements.

Dr. Andrew Klein is the Chair of the Nuclear Engineering Department at Oregon State University. Dr. Klein currently chairs the NERAC Nuclear Laboratory Requirements Subcommittee charged with determining the characteristics, capabilities, and attributes of a world-class laboratory and making recommendations for building INL into a world leader in nuclear energy technology.

3. Overarching Questions

1. What are the vision and mission of the newly created Idaho National Laboratory (INL)? Is DOE taking the steps necessary to ensure INL's success?

2. How will the reorganization of the Idaho laboratory complex affect DOE's nuclear energy R&D program? What role will other national laboratories with significant nuclear expertise, such as Argonne National Laboratory, play in nuclear energy R&D after INL begins operations?

3. Is DOE's nuclear energy program on track to develop the next-generation technologies needed to meet the Administration's goal of an "expansion of nuclear energy in the United States as a major component of our national energy policy"?

4. Overview

DOE is undertaking a major reorganization of the national laboratory complex in Idaho with the goal of enhancing the focus on nuclear energy R&D.

On April 30, 2003 Secretary Abraham announced that DOE would divide the current activities of the Idaho National Engineering and Environmental Laboratory (INEEL) into two contracts. One contract would cover cleanup of the site, which the Federal government has used for nuclear activities for 55 years. This first contract is designated the Idaho Cleanup Project (ICP). The other contract would be for the management of a new Idaho National Laboratory that would combine the current research activities of INEEL and Argonne National Laboratory-West (ANL-W), which shares the Idaho site. Under the plan, INL is to be the lead laboratory for DOE's nuclear energy R&D activities.[1] DOE's objective is to establish INL as the leading center in the world for nuclear energy technology within 10 years.[2]

DOE issued the final Request for Proposals for the management and operations contract for the new Idaho National Laboratory (INL) on May 26, 2004. The tentative award date for the INL contract is November 15, 2004, and INL is scheduled to begin operations on February 1, 2005.

This reorganization will end the 50-year association of ANL-W and the main Argonne laboratory, Argonne National Laboratory-East (ANL-E), located south of Chicago, IL. It is unclear how the laboratory reorganization, and the designation of INL as the lead laboratory for nuclear energy research, will affect ANL-E and other national laboratories that conduct research related to nuclear energy.

The Current Idaho Laboratory Complex. The Idaho laboratory complex – the term that refers to INEEL and ANL-W – site is 890 square miles (roughly 85 percent the size of Rhode Island), most of which is open land.

INEEL includes a cleanup operation involving radioactive materials left over from the Cold War, as well as an applied engineering laboratory. Currently, environmental management (cleanup) activities account for slightly over 70 percent of INEEL program

[1] Secretary of Energy Spencer Abraham announced a major mission realignment for the Idaho National Engineering and Environmental Laboratory on July 17, 2002, establishing the site as the Nation's leading center of nuclear energy research and development. (DOE Press Release No. R-02-144)

[2] A February 5, 2004 press release announcing DOE's draft Request for Proposals for the Idaho National Laboratory management contract states, "DOE expects that the laboratory will be the world's leading nuclear energy technology center within 10 years." (DOE Press Release No. R-04-023)

funding. The remaining 30 percent of INEEL funding is divided among programs in nuclear energy, energy efficiency and renewable energy, fossil energy, nuclear nonproliferation and national security. INEEL is operated for DOE by Bechtel BWXT Idaho, LLC, and employs about 6,000 people in its cleanup and R&D operations.

The federal government originally established the INEEL site as the National Reactor Testing Station in 1949. For many years, the Idaho site housed the largest concentration of nuclear reactors in the world – 52 nuclear reactors have been built at the site, including the U.S. Navy's first prototype nuclear propulsion system.

ANL-W, also established in 1949, is a research laboratory focused on nuclear safety, treatment of spent nuclear fuel, nonproliferation, decommissioning and decontamination technologies, and similar work. The University of Chicago has operated both the main laboratory in Illinois and the Idaho site from their beginnings. Typically, basic research is conducted at the Illinois site, while large-scale nuclear facility testing and development is conducted at the Idaho site. ANL-W employs about 650 people.

5. Issues

Is DOE allocating sufficient funding to build INL into the world's lead laboratory for nuclear energy R&D?

The Nuclear Energy Research Advisory Committee (NERAC) – non-government experts appointed by DOE to give advice on nuclear energy R&D – appointed a Task Force, which released a report this April. The NERAC Task Force concluded, "The funding at the Idaho Site, given the lead lab status, is clearly insufficient." The Task Force also found that for the Administration to achieve its goals for nuclear energy, "the lead lab site at Idaho requires an immediate and significant increase in funding to, e.g., clear up maintenance backlog and make key facilities mission ready." By contrast, the Administration's fiscal year 2005 (FY 05) request for nuclear energy R&D at INL is $6 million below the FY 04 level for INEEL and ANL-W.[3]

DOE has said that more funds will become available for INL as the Idaho cleanup work is completed over the next decade. But the NERAC Infrastructure Task Force urged DOE not to link INL funding to future funding decreases for cleanup for two reasons. First, the cleanup effort could go over-schedule or over-budget as it has "many obstacles." Second, INL's needs are too immediate to permit a budget strategy that ramps up over time.

In addition, the budget for INL must be sufficient to fund the development of the Next Generation Nuclear Plant (NGNP) – discussed more below – which DOE's strategic plan

[3] According to the FY05 Energy and Water Appropriations Subcommittee report 108-554. The total funding for INEEL is about $840 million. Total funding for ANL-W is included in the overall ANL budget and is not available separately.

describes as being central to the lab's new mission. The NGNP is a large, multi-year construction project that will cost in excess of $1 billion dollars.

NERAC is continuing to review DOE's plans for INL. Earlier this year, NERAC created a Subcommittee on Nuclear Laboratory Requirements to build on the work of the Infrastructure Task Force. The subcommittee is charged with identifying the characteristics, capabilities, and attributes a world-class nuclear laboratory should possess.

What role will Argonne National Laboratory and other national laboratories with nuclear expertise play in nuclear energy R&D after INL begins operations?

The NERAC Infrastructure Task Force recommended that DOE's nuclear energy R&D program continues to use facilities beyond the Idaho site, including other national laboratories.

About 70 percent of DOE's nuclear energy R&D funds are currently spent outside of the Idaho site. Other national laboratories with relevant programs include Argonne, Oak Ridge National Laboratory, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, Pacific Northwest National Laboratory, and Sandia National Laboratories.

How should INL balance its role as the lead laboratory for nuclear energy R&D and as a multi-purpose laboratory?

Members of NERAC have observed that maintaining a world-class laboratory requires supporting a sufficiently broad research program, including fields outside of traditional nuclear engineering such as materials science and computational science. Advantages of maintaining a diversity of research include opening up opportunities for cross-disciplinary research, and creating a greater draw for visiting researchers and new employees.

It remains unclear what balance the new INL will strike between nuclear and non-nuclear R&D. ANL-W has been dedicated exclusively to nuclear-related R&D throughout its history. DOE has repeatedly stated that, like the current INEEL, INL will be a multi-purpose laboratory. Yet the current strategic plan for the Idaho site emphasizes the laboratory's focus on nuclear-related research.[4] Clarifying the range of research activities appropriate for the new lab will be important to INL's long-term success.

What are the objectives for the Next Generation Nuclear Power Plant (NGNP)?

Identifying clear objectives for NGNP will be important to the project's success. The NGNP has been described in two potentially conflicting ways – on the one hand, as a demonstration of commercial viability, and on the other, as a research testbed. A demonstration project presumes more mature technology that is unlikely to be further

[4] Idaho National Engineering and Environmental Laboratory (INEEL) Strategic Plan, January 2003.

upgraded through government work. A testbed would presumably be more research oriented with more expensive, leading-edge technologies.

One of the stated purposes for the NGNP is to produce hydrogen – an important part of the Administration's hydrogen initiative. But the commercial interest in producing hydrogen through nuclear sources is uncertain at best, and the requirement to produce hydrogen significantly increases the costs of the reactor and changes its design.

6. Background on Nuclear R&D

Nuclear Industry Overview. With an installed capacity of 98.1 gigawatts, nuclear power provides 20 percent of the electricity generated in the United States. Thirty-one states, including the majority of the Eastern half of the country, are home to nuclear power plants, with five states – New Jersey, Vermont, New Hampshire, South Carolina, and New York – producing more of their electricity from nuclear power than any other source, according to the Nuclear Energy Institute. Illinois produces one half of its electricity through nuclear power.

The Energy Information Administration (EIA) forecasts that nuclear generating capacity will increase slightly by 2025, to 99.6 gigawatts installed capacity, due to nuclear plant life extensions and increased utilization of existing plants. However, with the May 2001 announcement that federal government will "support the expansion of nuclear energy in the United States as a major component of our national energy policy," supporters of nuclear energy project far larger increases for nuclear power. Under EIA projections, nuclear generation capacity would need to increase by over 60 gigawatts by 2020 to continue to provide 20 percent of the nation's electricity. However, a significant expansion of nuclear power will require improvements in cost, safety, waste management, and proliferation risk.[5] No new nuclear power plants have been ordered since 1977.

DOE Nuclear Energy R&D Programs. The Administration's FY 05 budget request for the Office of Nuclear Energy, Science, and Technology was $409.6 – about $5 million more than the FY 04 comparable appropriation. Of those amounts, the budget proposes to spend about $97 million on R&D – a cut of about $34 million from current spending.

DOE supports four major programs in nuclear energy R&D: the Nuclear Hydrogen Initiative, Advanced Fuel Cycle Initiative, Nuclear Power 2010, and Generation IV. Each program is described below, along with its current year funding and the funding included in Energy and Water Appropriations Subcommittee mark for FY 05.

Nuclear energy R&D conducted at the national laboratories is allocated from the program lines described below.

Nuclear Hydrogen Initiative (FY04 $6.5 million, E&W Mark $9.0 million)

[5] See for example, "The Future of Nuclear Power, An Interdisciplinary MIT Study," cited above.

The Nuclear Hydrogen Initiative is a program to conduct R&D on how to produce hydrogen using nuclear energy.

Advanced Fuel Cycle Initiative (AFCI) (FY04 $67 million, E&W Mark $68 million)
The mission of the AFCI is to develop new ways to treat spent nuclear fuel. One goal of the program is to inform a recommendation by the Secretary of Energy by 2010 on whether the U.S. needs a second nuclear waste repository in addition to Yucca Mountain.

Nuclear Power 2010 (FY04 $19 million, E&W Mark $5 million)
The Nuclear Power 2010 program is a joint government/industry cost-shared effort to identify sites for new nuclear power plants, develop advanced nuclear plant technologies, evaluate the business case for building new nuclear power plants, and demonstrate untested regulatory processes. These efforts are designed to pave the way for an industry decision by the end of 2005 to order a new nuclear power plant which would begin commercial operation early in the next decade.

Generation IV (FY04 $28 million, E&W Mark $40 million)
The goal of the Generation IV Nuclear Energy Systems Initiative is to address the fundamental research and development issues necessary to establish the viability of a next-generation nuclear energy system. The program is designed to improve safety, sustainability, cost-effectiveness, and proliferation resistance.

7. Questions to the Witnesses

Questions for Mr. William Magwood, IV
Your testimony should address the Department of Energy's (DOE) plans to reorganize the Idaho laboratory complex to form a new national laboratory. Please describe the reasons for designating this newly created laboratory as the lead laboratory for nuclear energy research and development (R&D). Specifically, please focus your testimony on the following questions:

1. What is the Department's view of the Report of the Infrastructure Task Force of the Nuclear Energy Research Advisory Committee, particularly its conclusion that, given the lead laboratory status, funding at the Idaho Site is clearly insufficient?

2. What role will Argonne National Laboratory and other national laboratories with nuclear expertise play in nuclear energy R&D after the Idaho National Laboratory (INL) is established?

3. The Department has indicated that INL will be a multi-purpose laboratory, but the current strategic plan for the Idaho National Engineering and Environmental Laboratory emphasizes the laboratory's transition to a focus on nuclear-related research. What specific programs do you envision supporting at INL beyond nuclear- and environmental management-related research?

4. The Next Generation Nuclear Plant (NGNP) has been described both as a demonstration of commercial viability and as a research testbed. What is the Department's view of the purpose of the NGNP? To what extent is the design of the NGNP being influenced by the requirements imposed by hydrogen production? To what extent would INL be capable of world leadership in nuclear energy R&D if the NGNP does not go forward?

Questions for Dr. Alan Waltar

In your testimony, please briefly outline the conclusions of the Seven Lab Action Plan, *Nuclear Energy: Power for the 21st Century*. Please also answer the following questions:

1. What should the U.S. goals be in the field of nuclear power? How can the new Idaho National Laboratory best contribute to those goals?

2. Are there gaps in the Department's present nuclear energy research and development (R&D) portfolio? Are there current research programs you would recommend discontinuing? If so, please explain your recommended changes.

3. The Department is working in partnership with the nuclear power industry to enable a new nuclear plant to be ordered and licensed for deployment within the decade. Is the nuclear energy R&D portfolio adequate to meet this goal? If not, how could this be rectified?

4. The Next Generation Nuclear Plant (NGNP) has been described both as a demonstration of commercial viability and as a research testbed. What do you believe the purpose of the NGNP should be? To what extent is the design of the NGNP being influenced by the requirements imposed by hydrogen production? To what extent would INL be capable of world leadership in nuclear energy R&D if the NGNP does not go forward?

Questions for Dr. Robert Long

In your written testimony, please briefly describe the recommendations made by the Nuclear Energy Research Advisory Committee Infrastructure Task Force. Please also answer the following questions:

1. What role do you recommend that Argonne National Laboratory and other national laboratories with nuclear expertise play in nuclear energy R&D after the Idaho National Laboratory (INL) is established?

2. The Department has indicated that INL will be a multi-purpose laboratory, but the current strategic plan for the Idaho National Engineering and Environmental Laboratory emphasizes the laboratory's transition to a focus on nuclear related

research. What specific programs should the Department support at INL beyond nuclear and environmental management related research?

3. The Next Generation Nuclear Plant (NGNP) has been described both as a demonstration of commercial viability and as a research testbed. What do you believe the purpose of the NGNP should be? To what extent is the design of the NGNP being influenced by the requirements imposed by hydrogen production? To what extent would INL be capable of world leadership in nuclear energy R&D if the NGNP does not go forward?

Questions for Dr. Andrew Klein

In your written testimony, please describe the work of the Nuclear Energy Research Advisory Committee subcommittee that you chair, and any preliminary recommendations you can make based on the work of the subcommittee thus far. Please also answer the following questions:

1. What role do you recommend that Argonne National Laboratory and other national laboratories with nuclear expertise play in nuclear energy R&D after the Idaho National Laboratory (INL) is established?

2. The Department has indicated that INL will be a multi-purpose laboratory, but the current strategic plan for the Idaho National Engineering and Environmental Laboratory emphasizes the laboratory's transition to a focus on nuclear-related research. What specific programs should the Department support at INL beyond nuclear- and environmental-management related research?

3. The Next Generation Nuclear Plant (NGNP) has been described both as a demonstration of commercial viability and as a research testbed. What do you believe the purpose of the NGNP should be? To what extent is the design of the NGNP being influenced by the requirements imposed by hydrogen production? To what extent would INL be capable of world leadership in nuclear energy R&D if the NGNP does not go forward?